

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) An ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, comprising:

an ultrasonic transducer including,

an ultrasonic transmitter for launching ultrasonic pulses of a prescribed frequency into the fluid to be measured in a fluid pipe from [[an]] the ultrasonic transducer along a measurement line[[;]], and

a receiver for receiving ultrasonic echoes reflected from a measurement region among the ultrasonic pulses incident into the fluid to be measured;

a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in [[a]] the measurement region ~~by receiving based on the received ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured;~~ and

a flow rate operation means for calculating a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured[[,]]; and

~~wherein the ultrasonic transmitter and a receiver for receiving ultrasonic echoes are made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave;~~

~~wherein a wedge for fixing said ultrasonic transmitter transducer to the outer surface of the fluid pipe for the fluid to be measured is provided[[;]], and~~

~~wherein the transducer is fixed on the wedge such that the distance from said ultrasonic transmitter to the outer surface of the fluid pipe at the prescribed frequency a distance of wave propagation from said ultrasonic transducer to an outer surface of the fluid~~

pipe is an integral multiple of a half-wave length of an ultrasonic wave incident into the fluid to be measured, and the prescribed frequency is determined by:

determining and the a distance of wave propagation from the outer surface of the fluid pipe to [[the]] an inner surface of the fluid pipe, and
setting the prescribed frequency as a frequency of an ultrasonic wave for
which the distance of wave propagation from the outer surface of the fluid pipe to the inner
surface of the fluid pipe is an integral multiple of a half-wave length of an ultrasonic wave
incident into the fluid to be measured through which the ultrasonic wave passes are formed to
be an integral multiple of a half wave length of ultrasonic wave incident into the fluid to be
measured.

2. (Currently Amended) The ultrasonic flowmeter according to claim 1, wherein a contact surface of the wedge with the fluid pipe ~~of the wedge~~ is ~~made~~ equal to the curvature of the fluid pipe.

3. (Currently Amended) The ultrasonic flowmeter according to any one of claim 1 or claim 2, wherein a distance from the ultrasonic transmitter transducer to the outer surface of the fluid pipe ~~of contacting~~ the wedge is made longer than [[the]] a distance obtained from multiplying [[the]] a velocity of the ultrasonic wave penetrating through the wedge by [[the]] a time of dead zone that [[the]] an ultrasonic oscillator of the ultrasonic transducer carries.

4. (Currently Amended) The ultrasonic flowmeter according to ~~any one of~~ claim 1 ~~or~~ claim 3, wherein [[the]] a material of the wedge from the ultrasonic transducer transmitter ~~and receiver~~ to the outer surface of the fluid pipe has an acoustic impedance is made equal to that of ~~the acoustic impedance of~~ the fluid pipe.

5. (Currently Amended) A wedge used for an ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, said ultrasonic flowmeter comprising[[:]] an ultrasonic transducer including an ultrasonic transmitter for launching ultrasonic pulses of a predetermined prescribed frequency into the fluid to be measured in a fluid pipe from [[a]] the ultrasonic transducer along a measurement line[[:]], and a receiver for receiving ultrasonic echoes reflected from a measurement region among the ultrasonic pulses incident into the fluid to be measured; a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in [[a]] the measurement region by receiving based on the received ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured; and a flow rate operation means for calculating a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured, the ultrasonic transmitter and the receiver for receiving the ultrasonic echoes being integrally formed, wherein the ultrasonic transmitter and the receiver for receiving ultrasonic echoes are made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave; wherein said wedge comprising comprises:

a fixation unit configured to fix said ultrasonic transducer to [[a]] the fluid pipe relating to [[a]] the fluid to be measured; and

an ultrasonic transmitting unit from the ultrasonic transmitter fixed to the fixation unit and to the outer surface of the fluid pipe, and

wherein the transducer is fixed on the wedge such that at the prescribed frequency a distance of wave propagation from said ultrasonic transducer to an outer surface of the fluid pipe is an integral multiple of a half-wave length of an ultrasonic wave incident into the fluid to be measured, and the prescribed frequency is determined by:

determining a distance of wave propagation from the outer surface of the fluid pipe to an inner surface of the fluid pipe, and

setting the prescribed frequency as a frequency of an ultrasonic wave generated by the transducer where the distance of wave propagation from the outer surface of the fluid pipe to the inner surface of the fluid pipe is an integral multiple of a half-wave length of an ultrasonic wave incident into the fluid to be measured

~~wherein the distance passing through from the outer surface of the fluid pipe to the inner surface of the fluid pipe is an integral multiple of a half-wave length of incident ultrasonic wave, and the distance from the ultrasonic transmitter to the outer surface of the fluid pipe in the wedge is taken to be an integral multiple of a half-wave length of incident ultrasonic wave.~~

6. (Currently Amended) The wedge according to claim 5, wherein a contact surface of the wedge with the fluid pipe of the wedge is made equal to the curvature of the fluid pipe.

7. (Currently Amended) The wedge for the ultrasonic flowmeter according to any one of claim 5 or claim 6, wherein the wedge comprises:

~~a fixation unit for fixing said ultrasonic transmitter to the fluid pipe relating to the fluid to be measured; and~~
~~an ultrasonic transmitting unit from the ultrasonic transmitter fixed to the fixation unit to the outer surface of the fluid pipe,~~

wherein [[the]] a distance from the ultrasonic ~~transmitter~~ transducer in the ultrasonic transmitting unit to the outer surface of the fluid pipe is made longer than [[the]] a distance calculated by multiplying a velocity with which an ultrasonic wave penetrates through the

wedge and [[the]] a time of dead zone that [[the]] an ultrasonic oscillator of the ultrasonic transducer of ultrasonic wave carries.

8. (Currently Amended) The wedge ~~for the ultrasonic flowmeter~~ according to claim 7, wherein [[the]] a material of the ultrasonic transmitting unit in the wedge has an acoustic impedance is made equal to that of the acoustic impedance of the fluid pipe.

9. (New) An ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, comprising:

an ultrasonic transducer including,

an ultrasonic transmitter configured to launch ultrasonic pulses of a prescribed frequency into the fluid to be measured in a fluid pipe from the ultrasonic transducer along a measurement line, and

a receiver configured to receive ultrasonic echoes reflected from a measurement region among the ultrasonic pulses incident into the fluid to be measured;

a flow velocity distribution measurement unit configured to measure flow velocity distribution of the fluid to be measured in the measurement region based on the received ultrasonic echoes

a flow rate operation unit configured to calculate a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured; and

a wedge configured to fix said ultrasonic transducer to the outer surface of the fluid pipe for the fluid to be measured,

wherein the transducer is fixed on the wedge such that at the prescribed frequency a distance of wave propagation from said ultrasonic transducer to an outer surface of the fluid

pipe is an integral multiple of a half-wave length of an ultrasonic wave incident into the fluid to be measured, and the prescribed frequency is determined by:

determining a distance of wave propagation from the outer surface of the fluid pipe to an inner surface of the fluid pipe, and

setting the prescribed frequency as a frequency of an ultrasonic wave for which the distance of wave propagation from the outer surface of the fluid pipe to the inner surface of the fluid pipe is an integral multiple of a half-wave length of an ultrasonic wave incident into the fluid to be measured.